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Kang et al.

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(54) **DISPLAY APPARATUS AND METHOD FOR PREVENTING DIVULGENCE OF IMAGE INFORMATION THEREOF**

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USPC 348/14.01, 14.07, 14.08, 14.12
See application file for complete search history.

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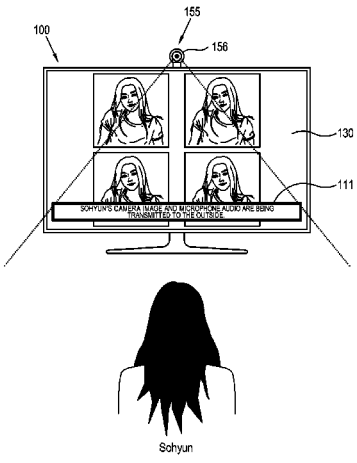
(57) **ABSTRACT**

Disclosed are a display apparatus and a method for preventing divulgence of image data thereof which may prevent image information including image data photographed by a camera of the display apparatus from being divulged by hacking, etc. The display apparatus includes a camera which captures an image; a display which displays the image thereon based on image data captured by the camera; a communicator which communicates with an outside of the apparatus through an Internet; and a controller which transmits image information including the image data captured by the camera, in the form of a transmission packet including the image data and a detection mark or indicator capable of detecting or indicating that the image data is to be transmitted to the outside, when the image information is to be transmitted to the outside through the communicator.

23 Claims, 6 Drawing Sheets



(51) **Int. Cl.**

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H04N 21/454	(2011.01)
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H04N 21/4788	(2011.01)
H04L 29/06	(2006.01)
H04N 7/15	(2006.01)
G06K 9/00	(2006.01)

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FIG. 1

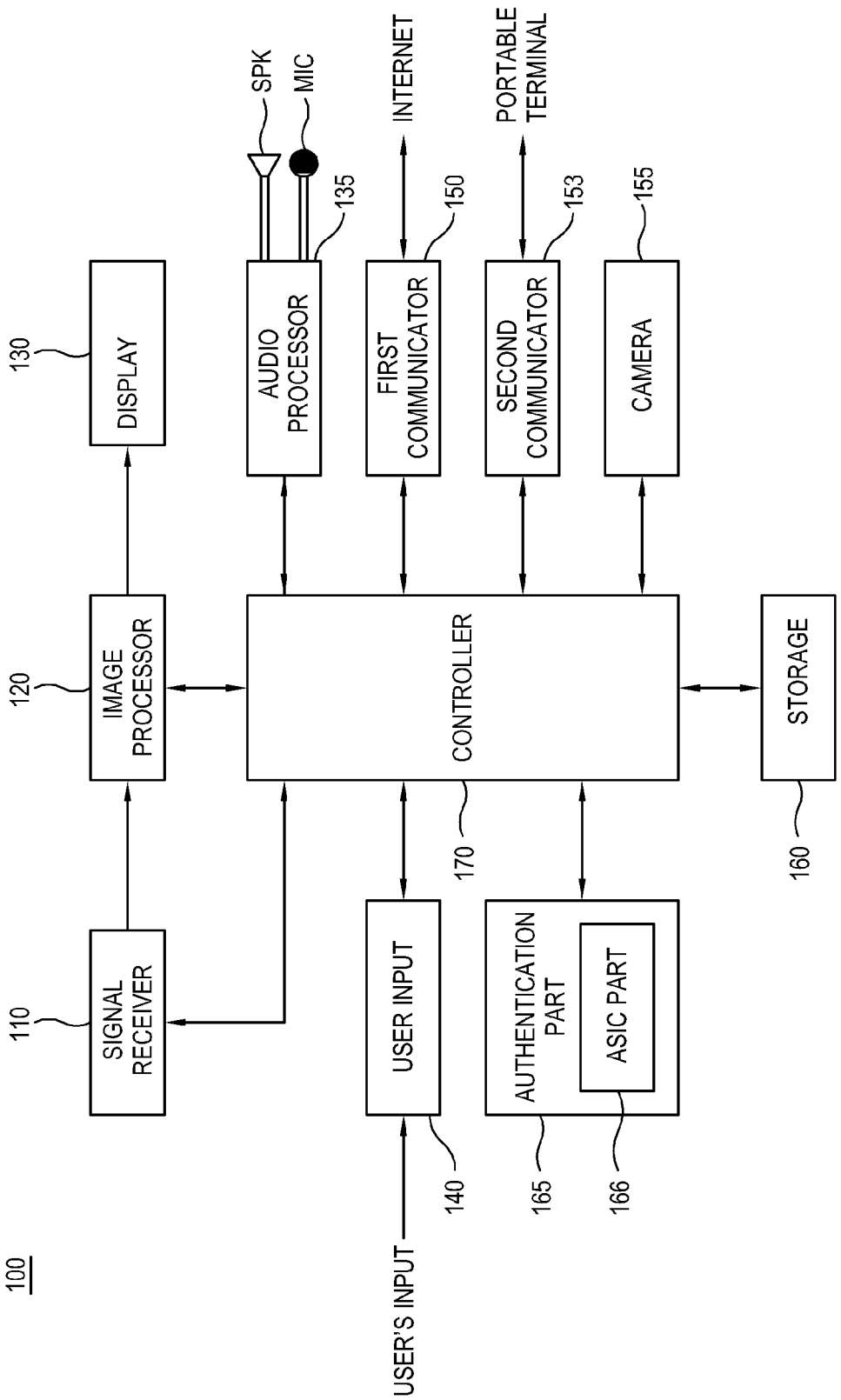

100
USER'S INPUT
SIGNAL RECEIVER
110
IMAGE PROCESSOR
120
DISPLAY
130
SPK
MIC
AUDIO PROCESSOR
135
USER INPUT
140
INTERNET
FIRST COMMUNICATOR
150
PORTABLE TERMINAL
SECOND COMMUNICATOR
153
CAMERA
155
CONTROLLER
170
AUTHENTICATION PART
ASIC PART
165
166
STORAGE
160

FIG. 2

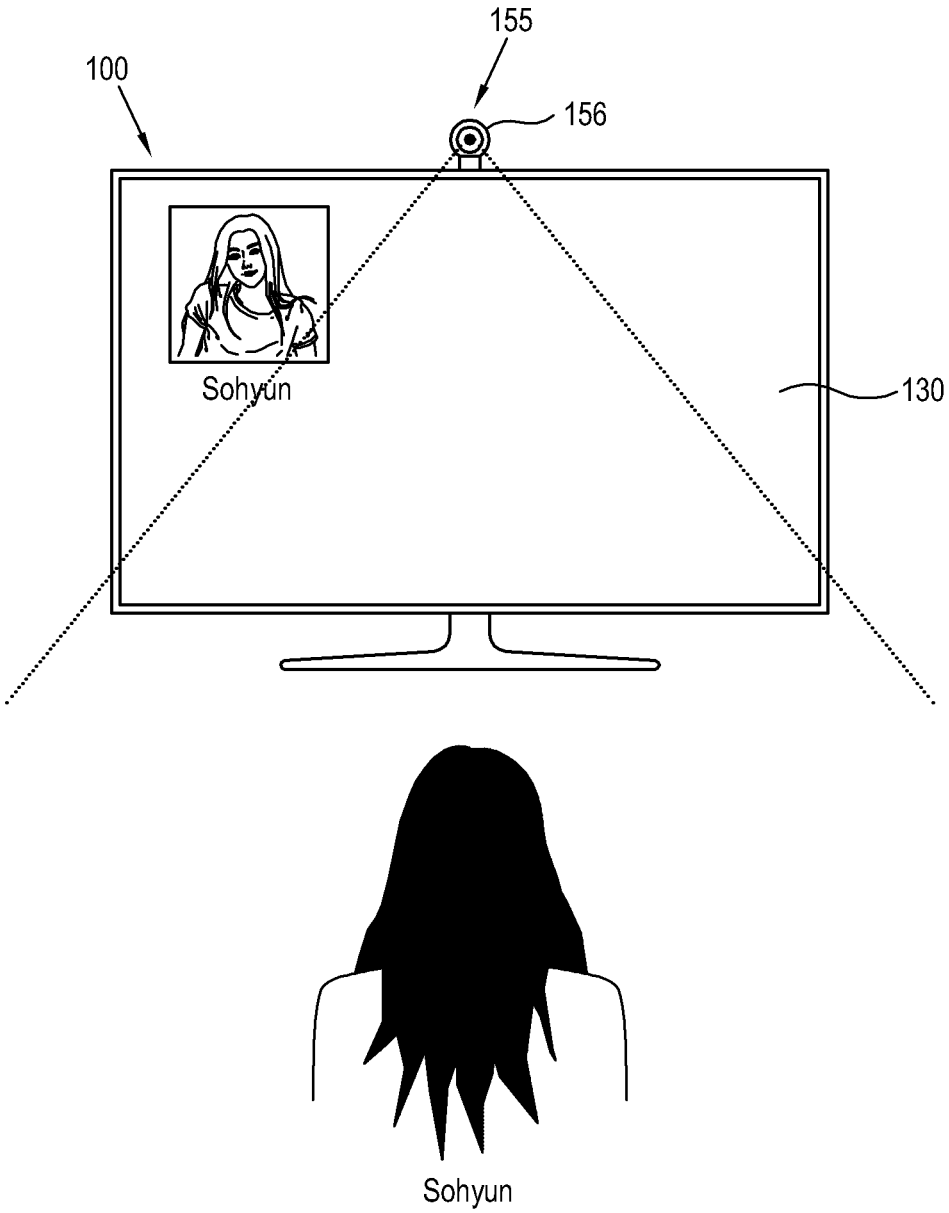


FIG. 3A

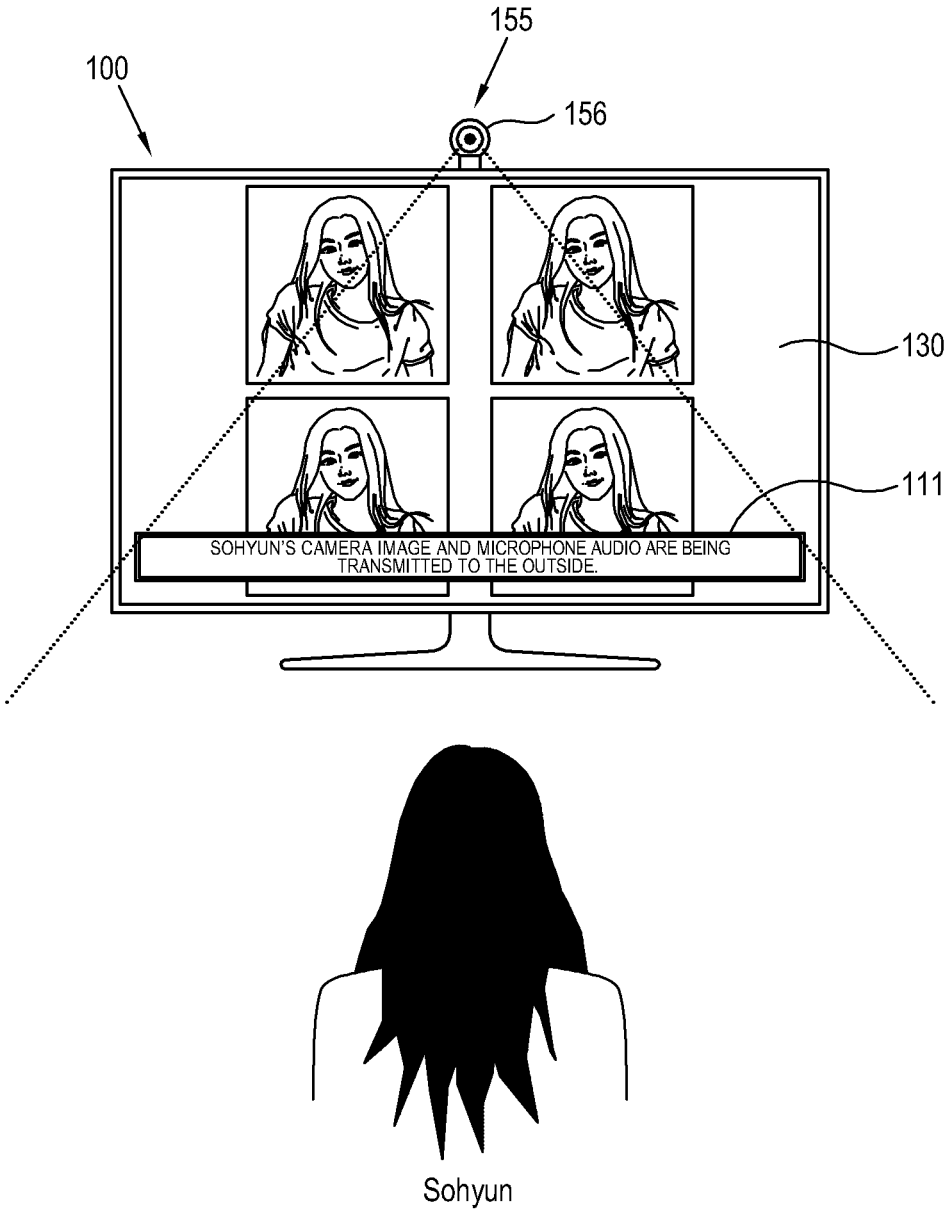

155
100
156
130
111
SOHYUN'S CAMERA IMAGE AND MICROPHONE AUDIO ARE BEING TRANSMITTED TO THE OUTSIDE.
Sohyun

FIG. 3B

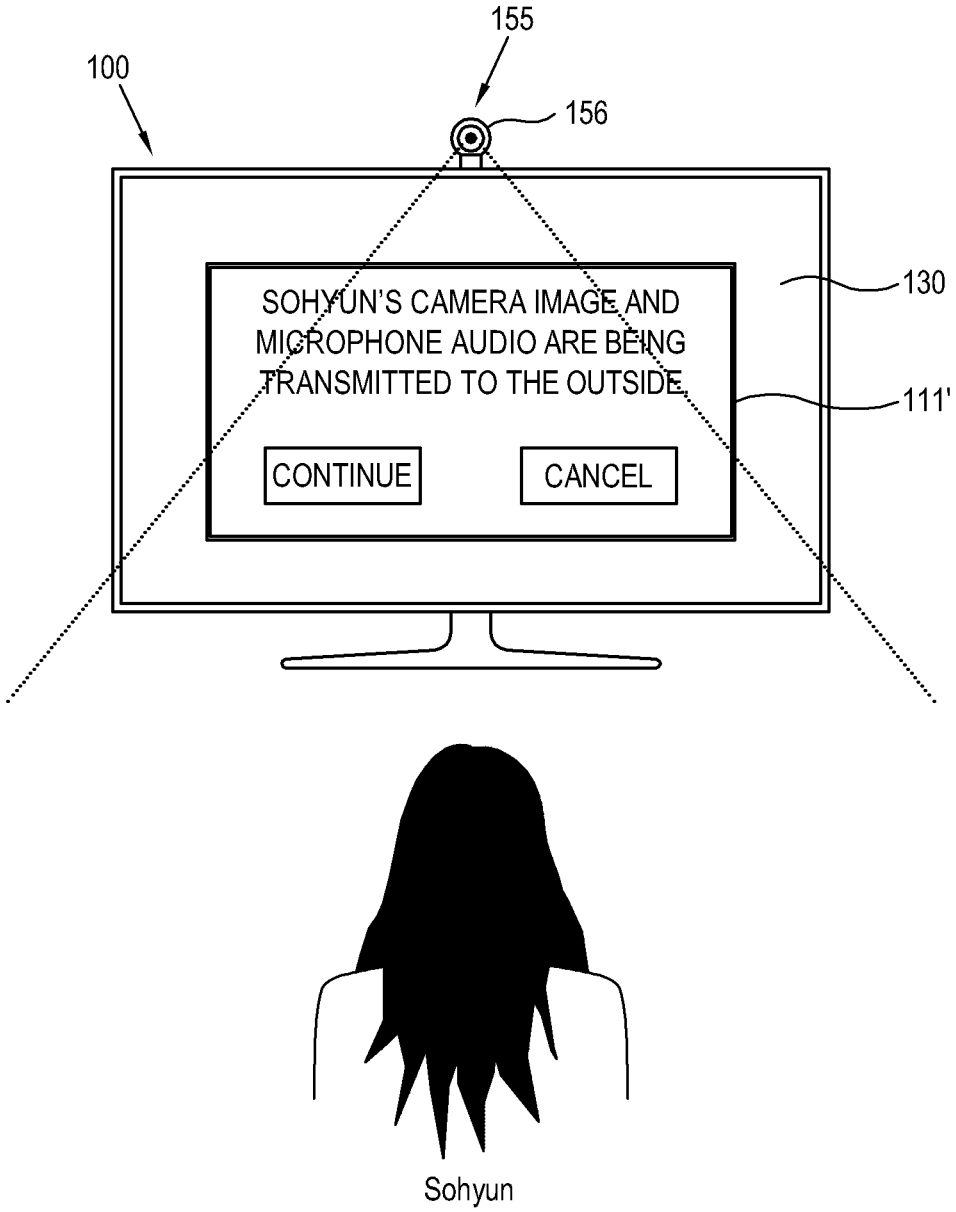

155
100
156
130
SOHYUN'S CAMERA IMAGE AND MICROPHONE AUDIO ARE BEING TRANSMITTED TO THE OUTSIDE
111'
CONTINUE
CANCEL
Sohyun

FIG. 4

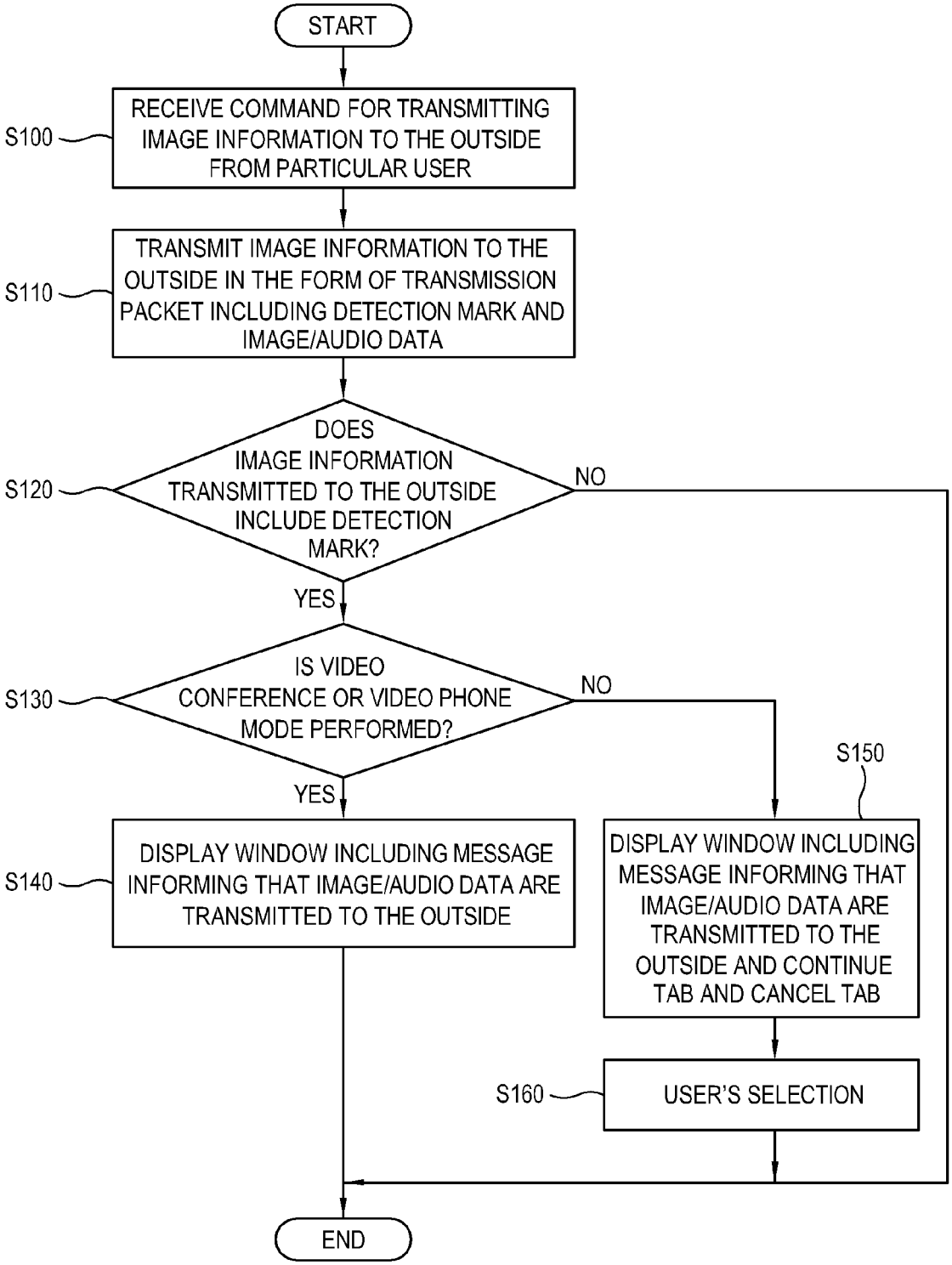
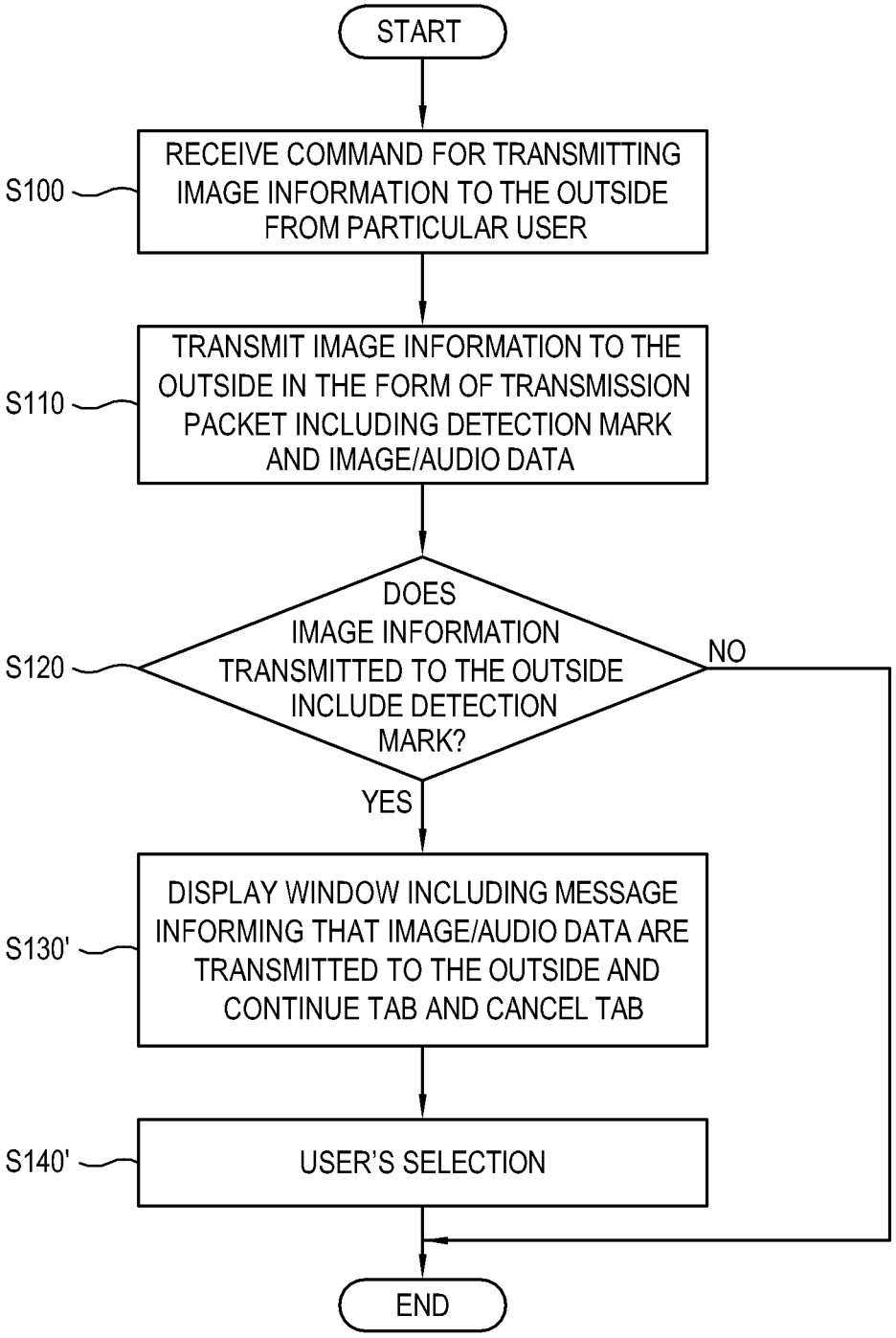

START
RECEIVE COMMAND FOR TRANSMITTING IMAGE INFORMATION TO THE OUTSIDE FROM PARTICULAR USER
S100
TRANSMIT IMAGE INFORMATION TO THE OUTSIDE IN THE FORM OF TRANSMISSION PACKET INCLUDING DETECTION MARK AND IMAGE/AUDIO DATA
S110
DOES IMAGE INFORMATION TRANSMITTED TO THE OUTSIDE INCLUDE DETECTION MARK?
S120
NO
YES
IS VIDEO CONFERENCE OR VIDEO PHONE MODE PERFORMED?
S130
NO
YES
S150
DISPLAY WINDOW INCLUDING MESSAGE INFORMING THAT IMAGE/AUDIO DATA ARE TRANSMITTED TO THE OUTSIDE
S140
DISPLAY WINDOW INCLUDING MESSAGE INFORMING THAT IMAGE/AUDIO DATA ARE TRANSMITTED TO THE OUTSIDE AND CONTINUE TAB AND CANCEL TAB
S160
USER'S SELECTION
END

FIG. 5


START
S100
RECEIVE COMMAND FOR TRANSMITTING IMAGE INFORMATION TO THE OUTSIDE FROM PARTICULAR USER
S110
TRANSMIT IMAGE INFORMATION TO THE OUTSIDE IN THE FORM OF TRANSMISSION PACKET INCLUDING DETECTION MARK AND IMAGE/AUDIO DATA
S120
DOES IMAGE INFORMATION TRANSMITTED TO THE OUTSIDE INCLUDE DETECTION MARK?
NO
YES
S130'
DISPLAY WINDOW INCLUDING MESSAGE INFORMING THAT IMAGE/AUDIO DATA ARE TRANSMITTED TO THE OUTSIDE AND CONTINUE TAB AND CANCEL TAB
S140'
USER'S SELECTION
END

DISPLAY APPARATUS AND METHOD FOR PREVENTING DIVULGENCE OF IMAGE INFORMATION THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from Korean Patent Application No. 10-2013-0118755, filed on Oct. 4, 2013 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field

Apparatuses and methods consistent with the exemplary embodiments discussed herein relate to a display apparatus and a method for preventing divulgence of image information thereof, and more particularly, to a display apparatus and a method for preventing divulgence of image information thereof which prevents image information including image data captured by a camera of the display apparatus from being divulged from the display apparatus to the outside of the apparatus by hacking, etc.

2. Description of the Related Art

With the development of the electronic communication industry, electronic devices including a portable terminal such as a smart phone and a display apparatus such a digital television (TV) have been developed into intelligent devices which perform multi-functions such as Internet communication and information search as well as their original functions.

In addition, widespread display apparatuses, such as a smart TV, which may access electronic communication networks, such as the Internet network, a local area network, etc., and receive multimedia contents including video/audio data and packet data therethrough have facilitated the study of display apparatuses which may customize and manage its functions such as with Internet communication and information search for each user.

The customized display apparatus provides respective users using the display apparatus with user accounts designated for each user for customization, and allows the users to use the functions of the display apparatus therethrough. Accordingly, any user who intends to log into his/her user account should perform user authentication.

The user authentication includes facial recognition through a camera, voiceprint recognition through a microphone, fingerprint recognition through a fingerprint recognition device and input of a user authentication code, such as ID and password.

Among the foregoing user authentication methods, facial recognition through the camera has emerged as an important authentication method of the customized display apparatus, with the display apparatuses being additionally equipped with the camera to perform a videoconferencing function in recent years.

However, image data of a scene including a user's face and surroundings that are photographed by the camera in the course of user authentication or stored in advance in a storage is exposed to a great risk of being divulged to the outside by hacking, etc. the communication due to the nature of the customized display apparatus that is used while being always connected to the Internet network.

To date, no customized display apparatus which may prevent the image data captured (or photographed) by the camera from being divulged by hacking has been developed.

SUMMARY

Additional aspects and/or advantages will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

Accordingly, one or more exemplary embodiments provide a display apparatus and a method for preventing divulgence of image data thereof which may prevent image information including image data captured by a camera of the display apparatus from being divulged by hacking, etc.

The foregoing and/or other aspects may be achieved by providing a display apparatus including: a camera which photographs a scene producing or capturing an image; a display which displays the image thereon based on image data captured by the camera; a communicator which communicates with the outside through an Internet (an unsecured network); and a controller which transmits image information including the image data captured by the camera, in the form of a transmission packet including the image data and a detection mark or indicator capable of detecting or indicating that the image data is to be transmitted to the outside of the apparatus, when the image information is to be transmitted to the outside through the communicator.

The detection mark may include at least one of a tag showing that the image information includes image data captured by the camera, and user information concerning who has photographed a scene. Here, the user information may include one of a user name and a user ID.

The controller may determine whether the image data are transmitted to the outside, based on whether the image information includes the detection mark when the image information is transmitted to the outside through the communicator.

At this time, the controller may further determine whether a video conference or video phone mode is performed or active when it is determined that the image data are transmitted to the outside, and when it is determined that the video conference or video phone mode is not performed or not active, the controller may display on the display a window including a message informing or indicating that the image data are transmitted to the outside, and a 'continue tab' for allowing a continued transmission of the image information to the outside and a 'cancel tab' for stopping transmission of the image information to the outside, and when it is determined that the video conference or video phone mode is performed, display on the display a window including the message only.

Alternatively, the controller may display on the display a window including a message informing or indicating that the image data are transmitted to the outside when it is determined that the image data are transmitted to the outside. Here, the window may further include a 'continue tab' for allowing the continued transmitting of the image information to the outside, and a 'cancel tab' for stopping transmitting the image information to the outside.

The display apparatus may further include a microphone for inputting an audio, and the image information may further include audio data that are input through the microphone.

The display apparatus may provide a customization function, and further include a storage to store therein image data captured by the camera, for each user.

The foregoing and/or another aspects may be achieved by providing a method for preventing divulgence of image information of a display apparatus which includes a camera, the method including: receiving a command for transmitting image information including image data photographed by the camera, to the outside; and transmitting the image information to the outside in the form of a transmission packet comprising the image data and a detection mark capable of detecting or indicating that the image data is to be transmitted to the outside, according to the command.

The detection mark may include at least one of a tag notifying that the image information includes image data photographed by the camera, and user information concerning who has photographed a scene. Here, the user information may include one of a user name and a user ID.

The method for preventing divulgence of image information of the display apparatus may further include: determining that the image data are transmitted to the outside depending on whether image information to be transmitted to the outside includes the detection mark; and displaying a window including a message informing or indicating that the image data are to be transmitted to the outside when it is determined that the image data are to be transmitted to the outside of the apparatus.

At this time, the method for preventing divulgence of image information of the display apparatus may further include determining whether a video conference or video phone mode is performed after determining that the image information is transmitted to the outside, and the displaying the window may include: displaying a window comprising the message and a 'continue tab' for allowing a continued transmission of the image information to the outside and a 'cancel tab' for stopping transmitting the image information to the outside when it is determined that the video conference or video phone mode is not performed; and displaying a window including the message only when it is determined that the video conference or video phone mode is performed.

Alternatively, the displaying the window may include displaying a window including the message and a 'continue tab' for allowing a continued transmission of the image information to the outside and a 'cancel tab' for stopping transmitting the image information to the outside.

The display apparatus may perform a customization function, and the image data photographed by the camera may include image data captured in real-time by the camera or image data stored for each user in advance.

Alternatively, the image information may further include an audio input through a microphone.

The foregoing and/or another aspects may be achieved by providing a method that may include converting image data into a data packet, adding an indicator to the packet for indicating that the packet is to be transmitted outside the display apparatus when the packet is to be transmitted outside the display apparatus, and initiating transmitting the packet. The method may further include displaying, when the packet includes the indicator, the image data to a user with a message indicating the image data is to be transmitted outside the display apparatus and allowing the user to stop the transmitting.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and/or other aspects will become apparent and more readily appreciated from the following description of the exemplary embodiments, taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a block diagram of a display apparatus according to an embodiment;

FIG. **2** illustrates an example of photographing a scene to produce an image by a camera of the display apparatus in FIG. **1**;

FIGS. **3**A and **3**B illustrate a window displayed by a display when image information including image data and audio data are transmitted to the outside by the display apparatus in FIG. **2**;

FIG. **4** is a flowchart showing an example of preventing divulgence of image information by the display apparatus according to the embodiment; and

FIG. **5** is a flowchart showing another example of preventing divulgence of image information by the display apparatus according to the embodiment.

DETAILED DESCRIPTION

Reference will now be made in detail to the embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below to explain the present invention by referring to the figures.

Below, exemplary embodiments will be described in detail with reference to accompanying drawings so as to be easily realized by a person having ordinary knowledge in the art. The exemplary embodiments may be embodied in various forms without being limited to the exemplary embodiments set forth herein. Descriptions of well-known parts are omitted for clarity, and like reference numerals refer to like elements throughout.

Hereinafter, a display apparatus and a method for preventing divulgence of image information thereof according to embodiments will be described in detail with reference to accompanying drawings.

FIG. **1** is a block diagram of a display apparatus **100** according to an embodiment.

The display apparatus **100** according to the embodiment performs customized functions for customizing and managing functions of the display apparatus **100** for each user. For example, the display apparatus **100** may include a device for displaying an image such as a smart TV or an IP TV. Hereinafter, the display apparatus **100** which is implemented as a smart TV will be explained as an example.

Referring to FIG. **1**, the display apparatus **100** includes a signal receiver **110**, an image processor **120**, a display **130**, an audio processor **135**, a user input **140**, first and second communicators **150** and **153**, a camera **155**, a storage **160**, an authentication part **165** and a controller **170**.

The signal receiver **110** may receive image signals included in broadcasting signals that are transmitted by a broadcasting signal transmission device (not shown), receive image signals from imaging devices such as DVD players or BD players, receive image signals from a personal computer (PC), receive image signals through a network such as the Internet or receive image contents as image signals stored in a storage medium such as a universal serial bus (USB) stick. The signal receiver **110** may be configured to include a tuner or a connection interface.

The image processor **130** may process image signals that are received through the signal receiver **110** to allow the display **130** to display an image based on the processed image signals. The signal processor **120** may decode image signals, enhance images or scale image signals.

The display **130** displays an image thereon based on an image signal processed by the image processor **120**. In displaying an image, the display **130** is not limited, and may

be formed as a liquid crystal display (LCD), an organic light emitting diode (OLED), an active matrix organic light emitting diode (AMOLED) or other flat display panels.

The audio processor **135** processes an audio signal that has been separated from an external broadcasting signal by a demultiplexer (not shown), and outputs the processed audio signal to a speaker SPK according to a control of the controller **170**.

If a microphone MIC is used as an element of the authentication part **165** for inputting authentication information of a user who is allowed to use a customization function of the display apparatus **100**, the audio processor **160** modulates and converts the audio signal provided by the microphone MIC into audio data, under the control of the controller **170**.

The controller **170** stores the converted audio data as authentication information in the storage **160**, or compares the converted audio data with those stored as authentication information in the storage **160** and performs user authentication, according to a user's command that is input through the user input **140** in a customization authentication menu (not shown) of an ASIC (Application Specific Integrated Circuit) part **166** (to be described later) displayed on the display **130**, or through an external portable terminal (not shown) that is permitted to be linked to the customization function of the display apparatus **100**.

The user input **140** receives the user's command. The user input **140** may include, e.g., a remote controller (not shown) and a remote control signal receiver (not shown) that receives a remote control signal including key input information corresponding to the user's input from the remote controller.

The first communicator **150** communicates with an external service server and/or website through the Internet (an unsecured communication network). The first communicator **150** exchanges user's input and information of analysis results of the user's input with the service server, according to the control of the controller **170**.

The second communicator **153** communicates with an external portable terminal in a wired or wireless manner (via a wireless communication network). The second communicator **153** may include at least one module for near field communication (NFC), i.e., Wi-Fi, Bluetooth, IrDA, Zigbee, wireless LAN and ultra wideband (UWB).

The camera **155** converts an optical signal of a scene into an image signal, and may include a camera module **156**. The camera module **156** processes and converts an image signal that is obtained by an image sensor in a video phone mode or photographing mode into image data including image frames, such as still images or videos. The converted image data may be displayed on the display **110** under the control of the controller **170** as shown in FIG. **2**.

The camera module **156** captures a user's image such as a user's face under the control of the controller **170** when the camera module **156** is used as an element of the authentication part **165** for inputting the user's authentication information to allow the user to use the customization function of the display apparatus **100**. The controller **170** stores the photographed or captured image frame of the user as authentication information in the storage **160**, or compares the image frame of the user with an image frame stored as authentication information in the storage **160** and performs user authentication, according to the user's input that is given through the customization authentication menu of the ASIC part **166** of the authentication part **165**.

The storage **160** stores therein contents (broadcasting channels, video on demand (VOD), etc.) that are played by the display apparatus **100**, or programs for controlling the display apparatus **100**.

The storage **160** stores therein a user's authentication information for authenticating usage of the customization function of the display apparatus **100**. The user's authentication information may include personal information including user's authentication code and user name, user's images and user's voice. The user's authentication code includes an ID and a password set by the user.

The storage **160** stores therein image information according to each user. The image information includes image data, such as still images or videos captured by the camera **155** and/or audio data input through the microphone MIC, while the display apparatus **100** is used.

The storage **160** stores therein a list of a user's desired contents (e.g., VOD and broadcasting channels) that has been obtained by the controller **170** through the Internet based on customization data extracted from status information. The status information is related to usage history of application programs, search words during web-browsing, broadcasting viewing history, usage history of contents, etc., and is collected by an external portable terminal allowed to be linked to the customization function of the display apparatus **100** or collected by the controller **170**. The status information is used to foresee the user's desired content. The customization data are used to search the contents through the Internet and form the list of the user's desired contents, and to display the list upon request from the user, by the control of the controller **170**.

The storage **160** may be realized as at least one storage medium of a flash memory, a hard disc, a micro type multimedia card, a card type memory (e.g. SD or XD memory), a random access memory (RAM), a static random access memory (SRAM), a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM), a programmable read-only memory (PROM), a magnetic memory, a magnetic disc, and an optical disc.

The authentication part **165** authenticates user's authentication information for the user who has been allowed to use the customization function of the display apparatus **100** to use the customization function.

The authentication part **165** may be realized as the ASIC part **166** that is designed to have an authentication program for performing the authentication process by using the user's authentication information.

If there is a request for allowing the usage of the customization function of the display apparatus **100** through the user input **140** or the external portable terminal, e.g., if the user logs into a user account for user customization through the user input **140** or the external portable terminal, the ASIC part **166** includes a customization authentication menu (not shown) that is displayed on the display **130** under the control of the controller **170**. As explained above, the user's authentication information may include personal information including user's authentication code including ID and password set by the user and user name, user's images and user's voice. The user's authentication information may be input or stored in the storage **160**, by the user input **140**, the external portable terminal, the camera module **156** of the camera **155** and the microphone MIC through the customization authentication menu of the ASIC part **166** that is displayed on the display **130** when the user authentication is performed or authentication information is set.

Hereinafter, it is assumed that the user's authentication information includes a user's image that is photographed or captured by the camera module **156** of the camera **155** and stored in the storage **160**.

For example, in a case of setting authentication information, when the user input and selects "user name (or a user ID)" and "camera authentication" of "authentication information setting" item on the customization authentication menu displayed on the display **130**, through the user input **140** or the external portable terminal, the controller **170** drives the camera module **156** of the camera **155** and captures a user's image and stores the photographed image frame, together with the user name (or user ID), as authentication information in the storage **160**.

In a case that the user logs into the user account for customization, when the user inputs and selects "user name (or user ID)" and "camera authentication" of "authentication information inputting" item on the customization authentication menu displayed on the display **130** through the user input **140** or the external portable terminal, the controller **170** drives the camera module **156** of the camera **155** and captures a user's image, and compares the image frame with the image frame of the user name (or user ID) stored as authentication information in the storage **160**, and if the two frames are identical, allows the user log into the customization function of the display apparatus **100**.

The controller **170** controls overall functions of the display apparatus **100**, and in particular, controls functions of the display apparatus **100** according to an input signal that is input by the user input **140** and received from the external portable terminal through the second communicator **153**.

As explained above, when the user sets authentication information, the controller **170** drives the camera module **156** of the camera **155**, captures the user's image and stores the photographed image frame, together with the user name, as authentication information in the storage **160** and when the user logs into the user account for customization, drives the camera module **156** of the camera **155**, photographs or captures the user's image, compares the photographed image frame with the image frame of the user name stored as authentication information in the storage **160**, and if two frames are equal or match, allows the user log into the customization function of the display apparatus **100**.

The controller **170** searches a user's desired content (e.g., VOD and broadcasting channels) on a regular basis through the Internet, based on customization data transmitted by the external portable terminal or collected by the controller **170**. The controller **170** stores in the storage **160** the list of the desired content that has been obtained by the search, and upon request from the user, displays the list stored in the storage **160**.

The controller **170** transmits image information including image data captured by the camera **155** and/or audio data input through the microphone MIC according to a user's command input through the user input **140** and the external portable terminal, to an external service server or website through the first communicator **150**, and monitors divulgence of the image information through the first communicator **150** to the outside of the display apparatus **100** without a user's command, such as over an insecure network.

More specifically, as shown in FIG. **3**A, the controller **170** outputs image information, including image data and/or audio data, in an image and audio through the display **110** and the speaker SPK when a video conference or video phone mode is performed or activated according to a user's command input through the user input **140** and the outer portable terminal, and at same time, encodes the image information through an encoder (not shown) and transmits the encoded image information to the service providing server or website, such as Skype, through the first communicator **150**.

If any image information includes image data captured by the camera **155** and/or audio data input through the microphone, the controller **170** controls the first communicator **150** to transmit the image data and/or audio data in the form of a transmission packet including a detection mark or indicator for detecting or indicating the transmission of the image data and/or audio data, as in Table 1 below, to the service providing server or website. The detection mark may include a tag such as 'camera' and/or user information which shows that image information includes the image data photographed by the camera **155**. The user information may include a user name such as 'Sohyun' or user ID.

TABLE 1

Example of transmission packet of image information

	Detection Mark				
Header	Tag	User Information	Image/Audio Data	...	Tail
	Camera	Sohyun	...	...	

Accordingly, the controller **170** may detect that the image data captured by the camera **155** and/or the audio data input through the microphone MIC are transmitted to the service providing server or website through the Internet by determining whether the image information includes the detection mark.

The controller **170** may display on the display **130** a window **111** including a message ("Sohyun's camera image and microphone audio are being transmitted to the outside.") informing or indicating that image information including image data and/or audio data is transmitted to the outside. Accordingly, the user may recognize through the message that the camera image and/or microphone audio is transmitted to the outside of the display apparatus **100** and is susceptible to unauthorized viewing.

If the service providing server or website transmits corresponding image information through the first communicator **150**, the controller **170** decodes the received image information through a decoder (not shown) and divides the received image information into image data and audio data through a demultiplexer (not shown), and then process the divided image data and audio data through the image processor **120** and the audio processor **135**, respectively, and outputs an image and audio through the display **130** and the speaker SPK, respectively, based on the processed image data and audio data.

When image information stored in the storage **160** or image information including image data and/or audio data that are photographed/captured and/or input in real-time through the camera **155** and/or microphone MIC is transmitted to the outside of the apparatus **100** through the first communicator **150** by hacking or the like without a user's command, the controller **170** determines whether the image information includes the detection mark, i.e., the tag and/or the user information, and if the image information includes the detection mark, the controller **170** detects that the image information including the image data and/or audio data is transmitted to the outside.

At this time, as shown in FIG. **3**B, the controller **170** may display on the display **130** a window **111'** including the

message ("Sohyun's camera image and microphone audio are being transmitted to the outside.") informing that the image information including the image data and/or audio data is transmitted to the outside. The window **111'** may include a 'continue tab' which allows a continued transmission of image information to the outside, and a 'cancel tab' which stops transmitting the image information to the outside.

Accordingly, if the foregoing message is displayed on the display **130** even though the user has not input a command to transmit the image information to the outside through the user input **140** and the portable terminal, the user may recognize that the image data photographed or captured by the camera **155** and/or the audio data input through the microphone MIC is transmitted to the outside possibly over an insecure network without his/her permission, and accordingly may select the 'cancel tab' to stop transmitting the image information to the outside of the apparatus **100**.

The controller **170** may include a central processing unit (CPU), and execute a firmware or operating program (not shown) which is programmed to control operations of respective elements. The controller **170** may further include a non-volatile memory such as a flash memory to store operating programs therein, and a volatile memory such as a DDR to load at least a part of the stored operating program for prompt access by the CPU.

FIG. **4** is a flowchart showing a method for preventing divulgence of image information of the display apparatus **100** according to the embodiment.

The controller **170** receives from a particular user a command for transmitting image information stored in the storage **160** or image information including image data photographed by the camera **155** and/or audio data input through the microphone MIC in real-time to the outside (S**100**). The particular user includes a legal user who has duly accessed the display apparatus **100** through user authentication to use the customization function of the display apparatus **100** through the user input **140** or the external portable terminal allowed to be linked to the display apparatus **100**, or an illegal user, i.e., a hacker who has illegally accesses the display apparatus **100** through the first communicator **150** by hacking authentication information from the Internet.

The controller **170** transmits the image information to the outside in the form of the transmission packet including the detection mark and image/audio data through the first communicator **150** according to the particular user's command (S**110**). The detection mark may include the tag which shows that the image information is the image data photographed and input by the camera **155** and the microphone MIC, and/or user information including the user name or user ID.

The controller **170** detects whether the image data captured by the camera **155** and/or the audio data input through the microphone MIC are transmitted to the outside by determining whether the image information which is to be transmitted to the outside includes the detection mark, i.e., the tag and/or the user information (S**120**).

If it is determined at operation S**120** that the image data and/or audio data are to be transmitted to the outside, the controller **170** further determines whether the video conference or video phone mode is performed or active (S**130**).

If it is determined at operation S**130** that the video conference or video phone mode is performed, the controller **170** displays on the display **130** the window **111** including the message informing that the image data and/or audio data are transmitted to the outside, as explained with reference to FIG. **3**A (S**140**). A user watching the display apparatus **100** may recognize from the window **111** that the image data of the camera **155** or audio data input through the microphone MIC are to be transmitted to the outside.

By contrast, if it is determined at operation S**130** that the video conference or video phone mode is not performed, the controller **170** may display on the display **130** the window **111'** including (i) the message informing that the image data and/or audio data are to be transmitted to the outside, and (ii) the 'continue tab' and 'cancel tab', as explained with reference to FIG. **3**B (S**150**).

Then, the user may select the 'continue tab' or 'cancel tab' to allow the continued transmission of the image information to the outside or stop the transmission of the image information, depending on whether he/she has requested the transmission of the image information to the outside (S**160**). As a result, the image information including the image data photographed by the camera **155** and/or audio data input through the microphone MIC is prevented from being divulged to the outside without the user's command.

Thereafter, the controller **170** may end the operation for preventing the divulgence of the image information according to a user's command for turning off the display apparatus **100** or repeat the operations for preventing the divulgence of the image information (S**100** to S**160**).

It has been exemplified and explained that the operations (S**100** to S**160**) for preventing the divulgence of the image information of the display apparatus **100** include determining whether the image data captured by the camera **155** and/or the audio data input through the microphone MIC are transmitted to the outside (S**120**) of the display apparatus **100** and then determining whether the video conference or video phone mode is performed (S**130**), but the embodiment is not limited thereto.

For example, referring to FIG. **5**, after it is determined whether the image data and/or audio data are transmitted to the outside (S**120**), the controller **170** may immediately display on the display **130** the window **111'** including the message informing or indicating that the image data and/or the audio data are to be transmitted to the outside, and the 'continue tab' and 'cancel tab' (S**130'**).

At this time, a user may select the 'continue tab' or 'cancel tab' to allow the continued transmission of the image information to the outside of the apparatus **100** or stop the transmission of the image information, depending on whether he/she has requested the transmission of the image information (S**140'**). As a result, the image information including the image data obtained by the camera **155** and/or audio data input through the microphone MIC is prevented from being divulged without a user's command.

As explained above, in the display apparatus and the method for preventing divulgence of image information thereof according to the embodiments, the controller **170** transmits the image information to the outside in the form of the transmission packet including the detection mark and the image/audio data through the first communication unit **150** if the command for transmitting the image information including the image data photographed by the camera **155** and/or the audio data input through the microphone MIC to the outside is input by the particular user. As a result, the controller **170** may determine through the detection mark whether the image data and/or audio data are transmitted through the first communicator **150** to the outside, and display the windows **111** and **111'** including the message informing or indicating that the image data and/or audio data are to be transmitted to the outside of the apparatus **100**. Accordingly, the user may allow the continued transmission

of the image information to the outside or stop transmitting the image information depending on whether he/she has requested for the transmission of the image information to the outside, and thus may prevent the image data and/or audio data from being divulged without his/her command.

Although a few exemplary embodiments have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these exemplary embodiments without departing from the principles and spirit of the embodiments, the range of which is defined in the appended claims and their equivalents.

Although a few embodiments have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A display apparatus, comprising:

a camera which photographs a scene to capture an image;

a display which displays the image thereon based on image data captured by the camera;

a communicator which communicates with an outside of the display apparatus through a communication network; and

a controller which determines whether image information comprises, either first image information in which the image data captured by the camera is not included or second image information in which the image data captured by the camera is included, when the image information is transmitted via the communicator to the outside, and in response to the image information comprising the first image information, transmits the first image information to the outside, and in response to the image information comprising the second image information, performs a security operation with respect the second image information and transmits the second image information to the outside,

wherein the security operation comprises forming a transmission packet of the transmitted second image information to comprise a detection mark showing that the image information includes the image data captured by the camera.

2. The display apparatus according to claim **1**, wherein the detection mark comprises at least one of a tag showing that the image information comprises the image data captured by the camera, and user information concerning who has photographed the scene.

3. The display apparatus according to claim **2**, wherein the user information comprises one of a user name and a user ID.

4. The display apparatus according to claim **1**, wherein the controller determines whether the image data are to be transmitted to the outside, based on whether the image information comprises the detection mark when the image information is to be transmitted to the outside via the communicator.

5. The display apparatus according to claim **4**, wherein the controller further determines whether a video conference or video phone mode is active when it is determined that the image data are to be transmitted to the outside, and when it is determined that the video conference or video phone mode is not active, displays on the display a window comprising a message indicating that the image data captured by the camera are to be transmitted to the outside, a 'continue tab' for allowing a continued transmission of the image information to the outside, and a 'cancel tab' for stopping transmission of the image information to the outside, and when it is determined that the video conference or video phone mode is active, displays on the display a window comprising the message only.

6. The display apparatus according to claim **4**, wherein the controller displays on the display a window comprising a message indicating that the image data captured by the camera are to be transmitted to the outside when it is determined that the image data are to be transmitted to the outside.

7. The display apparatus according to claim **6**, wherein the window further comprises a 'continue tab' for allowing the continued transmission of the image information to the outside, and a 'cancel tab' for stopping transmission of the image information to the outside.

8. The display apparatus according to claim **1**, further comprising a microphone for inputting an audio, wherein the image information further comprises audio data that is input through the microphone.

9. The display apparatus according to claim **1**, providing a customization function, and further comprising a storage to store therein the image data captured by the camera, for each user.

10. A method for preventing divulgence of image information of a display apparatus which comprises a camera, the method comprising:

receiving a command for transmitting image information to an outside of the display apparatus;

determining whether the image information comprises either first image information in which image data captured by the camera is not included or second image information in which the image data captured by the camera is included; and

in response to the image information comprising the first image information, transmitting the first image information to the outside, and in response to the image information comprising the second image information, performing a security operation with respect the second image information and transmitting the second image information to the outside,

wherein the security operation comprises forming a transmission packet of the transmitted second image information to comprise a detection mark showing that the image information includes the image data captured by the camera.

11. The method according to claim **10**, wherein the detection mark comprises at least one of a tag notifying that the image information comprises the image data captured by the camera, and user information concerning who has photographed the scene.

12. The method according to claim **11**, wherein the user information comprises one of a user name and a user ID.

13. The method according to claim **10**, further comprising:

determining that the image data are to be transmitted to the outside depending on whether image information to be transmitted to the outside comprises the detection mark; and

displaying a window comprising a message indicating that the image data captured by the camera are to be transmitted to the outside when it is determined that the image data are to be transmitted to the outside.

14. The method according to claim **13**, further comprising determining whether a video conference or video phone mode is active after determining that the image information is to be transmitted to the outside,

wherein the displaying the window comprises:

displaying a window comprising the message, a 'continue tab' for allowing a continued transmission of the image information to the outside, and a 'cancel tab' for stopping transmission of the image information to the outside when it is determined that the video conference or video phone mode is not active; and

displaying a window comprising the message only when it is determined that the video conference or video phone mode is active.

15. The method according to claim **13**, wherein the displaying the window comprises displaying a window comprising the message, a 'continue tab' for allowing a continued transmission of the image information to the outside, and a 'cancel tab' for stopping transmission of the image information to the outside.

16. The method according to claim **10**, wherein the display apparatus performs a customization function, and the image data captured by the camera comprise image data captured in real-time by the camera or image data stored for each user in advance.

17. The method according to claim **10**, wherein the image information further comprises an audio that is input through a microphone.

18. A method, comprising:

converting image data in a display apparatus into a data packet;

determining whether the image data is captured by a camera;

in response to the image data not being captured by the camera, initiating transmitting the data packet and in response to the image data being captured by the camera, adding an indicator to the data packet for indicating that the packet is to be transmitted to an outside of the display apparatus; and

initiating transmitting the data packet.

19. A method as recited in claim **18**, further comprising displaying, when the packet includes the indicator, the image data to a user with a message indicating the image data captured by the camera is to be transmitted outside the display apparatus.

20. A method as recited in claim **19**, further comprising allowing the user to stop the transmitting.

21. A method, comprising:

converting image data into a data packet;

determining whether the image data is captured by a camera; and

in response to the image data not being captured by the camera, initiating transmitting the data packet, and in response to the image data being captured by the camera, adding an indicator to the data packet for indicating that the data packet has been transmitted over an insecure network; and

initiating transmitting the data packet over the insecure network.

22. A method as recited in claim **21**, further comprising displaying, when the data packet includes the indicator, the image data to a user with a message indicating the image data is to be transmitted over the insecure network.

23. A method as recited in claim **22**, further comprising allowing the user to stop the transmitting.

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